CLAIMS

1. A solid electrolytic capacitor comprising a valve acting metal having pores, a dielectric film formed on a surface of the valve acting metal, and a solid electrolyte layer provided on the dielectric film, wherein at least a portion of the solid electrolyte layer is of a lamellar structure.

2. The solid electrolytic capacitor described in claim 1, in which the solid electrolyte layer is formed on an outer surface of the dielectric film or on the outer surface and inside the pores.

Sub a2

3. The solid electrolytic capacitor as claimed in claim 1 or 2, in which at least a portion of interlayer portion in the lamellar structure comprises a space portion.

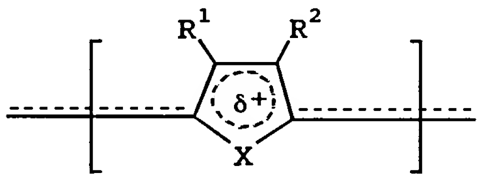
4. The solid electrolytic capacitor as claimed in any one of claims 1 to 3, in which each unit layer of the solid electrolyte constituting the lamellar structure has a thickness in the range of 0.01-5μm and a total thickness of the solid electrolyte layer is in the range of 1-200μm.

5. The solid electrolytic capacitor as claimed in any one of claims 1 to 4, in which the solid electrolyte layer comprises a composition containing a π-electron conjugate polymer and/or

Sub a3

other electrically conducting polymer.

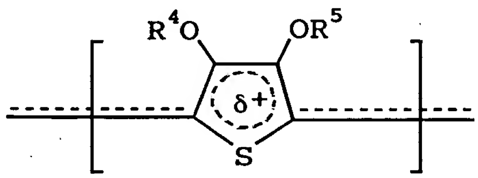
6. The solid electrolytic capacitor as claimed in claim 5, in which the electrically conducting polymer comprises as a repeating unit a structural unit represented by general formula (I) below



(I)

(wherein the substituents R^1 and R^2 each independently represents hydrogen atom, a linear or branched, saturated or unsaturated C1-6 (meaning 1 to 6 carbon atoms, hereafter the same) alkyl group, a linear or branched, saturated or unsaturated C1-6 alkoxy group, a hydroxyl group, a halogen atom, a nitro group, a cyano group, a trihalomethyl group, a phenyl group and a substituted phenyl group, R^1 and R^2 may be combined to each other at any position to form at least one divalent chain for forming at least one 5-, 6- or 7-membered saturated or unsaturated ring structure, X represents a hetero atom selected from S, O, Se, Te or NR^3, R^3 represents a hydrogen atom, a linear or branched, saturated or unsaturated C1-6 alkyl group, a phenyl group or a linear or branched, saturated or unsaturated C1-6 alkoxy, the alkyl group and the alkoxy group represented by R^1, R^2 or R^3 may optionally contain in the chain thereof a carbonyl bond, an ether bond, an ester bond, an amide bond or an imino bond, and δ represents a number of from 0 to 1).

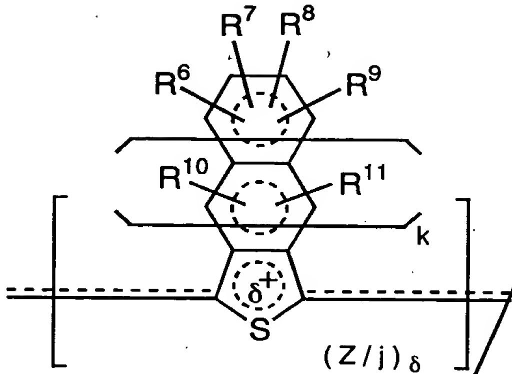
7. The solid electrolytic capacitor as claimed in claim 5, in which the electrically conducting polymer comprises as a repeating unit a structural unit represented by general formula (II) below



(II)

(wherein the substituents R^4 and R^5 each independently represents hydrogen atom, a linear or branched, saturated or unsaturated C1-6 alkyl group or a substituent for forming at least one 5-, 6- or 7-membered cyclic structure containing the two oxygen elements shown in the formula by combining the C1-6 alkyl groups to each other at any position, the ring structure formed in the scope thereof includes a chemical structure such as a vinylene group which may be substituted and a phenylene group which may be substituted, and δ represents a number of from 0 to 1).

8. The solid electrolytic capacitor as claimed in claim 5, in which the electrically conducting polymer is a condensed heteropolycyclic polymer comprising as a repeating unit a structural unit represented by general formula (III) below



(III)

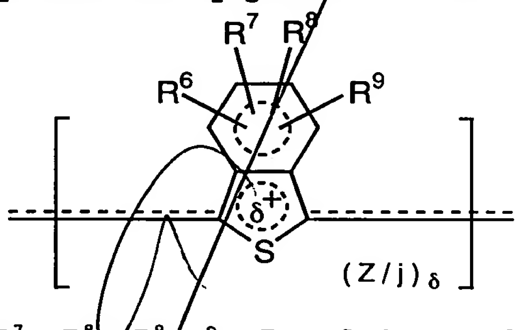
(wherein the substituents R^6, R^7, R^8, R^9, R^{10} and R^{11} each independently represents a monovalent group selected from the group consisting of a hydrogen atom, a linear or branched, saturated or unsaturated C1-10 alkyl, alkoxy or alkyl ester group, a halogen atom, a nitro group, a cyano group, a primary, secondary or tertiary amino group, a trihalomethyl group, a phenyl group and a substituted phenyl group, the alkyl chains of R^6, R^7, R^8, R^9, R^{10} and R^{11} may combine to each other at any position to form at least one divalent chain for forming at least one 3-, 4-, 5-, 6- or 7-membered saturated or unsaturated hydrocarbon cyclic structure together with the carbon atoms to which the substituents are bonded,

the alkyl group, the alkoxy group or the alkyl ester group of R^6, R^7, R^8, R^9, R^{10} or R^{11} or the cyclic hydrocarbon chain formed by the substituents may contain any number of any of carbonyl, ether, ester, amide, sulfide, sulfinyl, sulfonyl and imino bonds,

k represents a number of the condensed ring enclosed by the thiophene ring and the benzene ring having substituents R^6 to R^9 and represents an integer of from 0 to 3 excluding a form

in which all of R^6 to R^9 represent a hydrogen atom from among derivatives in which k=0, and the condensed ring may optionally contain 1 to 2 nitrogen atoms (N) or N-oxide, δ is in the range of 0 to 1, Z represents an anion, j is a valency of Z and is 1 or 2.)

9. The solid electrolytic capacitor as claimed in claim 8, in which the condensed heteropolycyclic polymer represented by general formula (III) is a condensed heteropolycyclic polymer comprising represented by general formula (IV) below where k=0



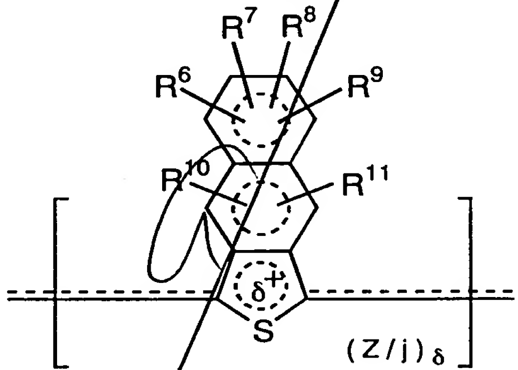
(IV)

(wherein R^6, R^7, R^8, R^9, δ, Z and j are the same as in formula (III), and the condensed ring may optionally contain 1 to 2 nitrogen atoms (N) or N-oxide).

10. The solid electrolytic capacitor as claimed in claim 9, in which the condensed heteropolycyclic polymer represented by general formula (IV) above is a condensed heteropolycyclic polymer selected from 5,6-dioxymethylene-isothianaphthenylene polymer and and 5,6-dimethoxy-isothianaphthenylene polymer.

11. The solid electrolytic capacitor as claimed in claim 8,

in which the condensed heteropolycyclic polymer represented by general formula (III) is a condensed heteropolycyclic polymer comprising represented by general formula (V) below where k=1



(V)

(wherein R^6, R^7, R^8, R^9, R^{10}, R^{11}, δ, Z and j are the same as in formula (III), and the condensed ring may optionally contain 1 to 2 nitrogen atoms (N) or N-oxide).

12. The solid electrolytic capacitor as claimed in claim 5, in which the electrically conducting polymer is an electrically conducting polythiophene and the composition containing the electrically conducting polythiophene contains a sulfate ion in the range of 0.1-10 mol% and a naphthalenesulfonate ion in the range of 1-50 mol%.

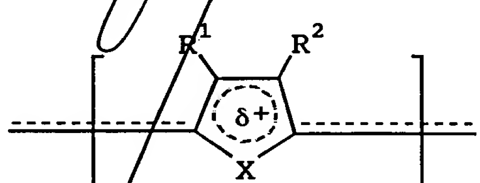
13. The solid electrolytic capacitor as claimed in claim 12, in which the electrically conducting polythiophene contains as a repeating unit the structural unit represented by general formula (II) described in (7) above.

14. The solid electrolytic capacitor as claimed in claims 12

or 13, in which the sulfate ion is derived from a reduced form of persulfate.

15. A solid electrolytic capacitor comprising a valve acting metal having pores, a dielectric film formed on a surface of the valve acting metal, and a solid electrolyte layer comprising an electrically conducting polymer composition layer provided on the dielectric film, in which the composition contains sulfoquinone anion having at least one sulfo anion group and a quinone structure in the molecule in an amount of 0.1-50 mol% and an anion other than the sulfoquinone anion in the range of 0.1-10 mol%.

16. The solid electrolytic capacitor as claimed in claim 15, in which a main chain of the electrically conducting polymer in the composition contains a structural unit represented by general formula (I) below

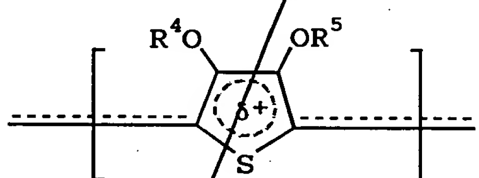


(I)

(wherein the substituents R^1 and R^2 each independently represents hydrogen atom, a linear or branched, saturated or unsaturated C1-6 alkyl, a linear or branched, saturated or unsaturated C1-6 alkoxy group, a hydroxyl group, a halogen atom, a nitro group, a cyano group, a trihalomethyl group, a phenyl group and a substituted phenyl group, R^1 and R^2 may be combined

to each other at any position to form at least one divalent chain for forming at least one 5-, 6- or 7-membered saturated or unsaturated ring structure, X represents a hetero atom selected from S, O, Se, Te or NR^3, R^3 represents H, a linear or branched, saturated or unsaturated C1-6 hydrocarbon group, a phenyl group or a linear or branched, saturated or unsaturated C1-6 alkoxy group, the alkyl group and the alkoxy group represented by R^1, R^2 or R^3 may optionally contain in the chain thereof a carbonyl bond, an ether bond, an ester bond, an amide bond or an imino bond, and δ represents a number of from 0 to 1).

17. The solid electrolytic capacitor as claimed in claim 16, in which the structural unit represented by formula (I) is a chemical structure represented by the following formula (II):



(II)

(wherein the substituents R^4 and R^5 each independently represents hydrogen atom, a linear or branched, saturated or unsaturated C1-6 alkyl group or a substituent for forming at least one 5-, 6- or 7-membered heterocyclic structure containing the two oxygen elements shown in the formula by combining the C1-6 alkyl groups to each other at any position, the ring structure formed in the scope thereof includes a chemical structure such as a vinylene group which may be substituted and a substituted phenylene group which may be

substituted, and δ represents a number of from 0 to 1).

18. The solid electrolytic capacitor as claimed in any one of claims 15 to 17, in which a base structure of the sulfoquinone anion is at least one selected from the group consisting of p-benzoquinone, o-benzoquinone, 1,2-naphthoquinone, 1,4-naphthoquinone, 2,6-naphthoquinone, 9,10-anthraquinone, 1,4-anthraquinone, 1,2-anthraquinone, 1,4-chrysenequinone, 5,6-chrysenequinone, 6,12-chrysenequinone, acenaphthoquinone, acenaphthenequinone, camphorquinone, 2,3-bornadione, 9,10-phenanthrenequinone, and 2,7-pyrenequinone.

19. The solid electrolytic capacitor as claimed in claim 18, in which the sulfoquinone contains in the molecule thereof a sulfoquinone having at least one sulfoanion group and a quinone structure and a hydroquinone structure and/or quinhydrone structure thereof produced from the sulfoquinone.

20. The solid electrolytic capacitor as claimed in any of claims 15 to 19, in which the anion other than the sulfoquinone anion is a reduced form anion of an oxidizing agent.

21. The solid electrolytic capacitor as claimed in claim 20, in which the reduced form anion of an oxidizing agent is a sulfate ion.

22. A solid electrolytic capacitor comprising a valve acting

metal having pores, a dielectric film formed on a surface of the valve acting metal, and a solid electrolyte layer comprising an electrically conducting polymer composition layer provided on the dielectric film, in which the composition contains at least one anthracenemonosulfonate anion selected from anthracenesulfonic acid having a sulfonate group or derivatives thereof as a dopant.

23. The solid electrolytic capacitor as claimed in claim 20, in which the solid electrolytic capacitor as claimed in claim 22, in which the anthracenemonosulfonate anion is contained in the range of 0.1-50 mol% of total repeating unit of the electrically conducting polymer.

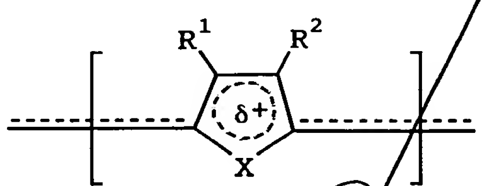
24. The solid electrolytic capacitor as claimed in claim 22 or 23, which contains in addition to the anthracene monosulfonate anion a reduced form anion of an oxidizing agent in the range of 0.1-10 mol%.

25. The solid electrolytic capacitor as claimed in claim 24, in which the reduced form anion of an oxidizing agent is a sulfate ion.

26. The solid electrolytic capacitor as claimed in any one of claims 22 to 25, in which the anthracenesulfonic acid derivative is anthracenemonosulfonic acid of which at least one of hydrogen atoms on an anthracene ring is substituted by a C1-12

linear or branched, saturated or unsaturated hydrocarbon group or alkoxy group.

27. The solid electrolytic capacitor as claimed in claim 22, in which a main chain of the electrically conducting polymer in the composition contains a structural unit represented by general formula (I) below

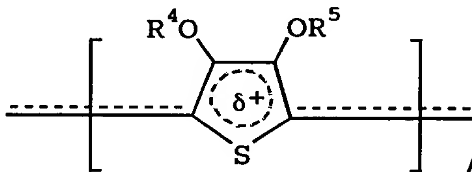


(I)

(wherein the substituents R^1 and R^2 each independently represents hydrogen atom, a linear or branched, saturated or unsaturated C1-6 alkyl, a linear or branched, saturated or unsaturated C1-6 alkoxy group, a hydroxyl group, a halogen atom, a nitro group, a cyano group, a trihalomethyl group, a phenyl group and a substituted phenyl group, R^1 and R^2 may be combined to each other at any position to form at least one divalent chain for forming at least one 5-, 6- or 7-membered saturated or unsaturated ring structure, X represents a hetero atom selected from S, O, Se, Te or NR^3, R^3 represents H, a linear or branched, saturated or unsaturated C1-6 hydrocarbon group, a phenyl group or an alkoxy group having a linear or branched, saturated or unsaturated C1-6 alkoxy group, the alkyl group and the alkoxy group represented by R^1, R^2 or R^3 may optionally contain in the chain thereof a carbonyl bond, an ether bond, an ester bond, an amide bond or an imino bond, and δ represents a number of

from 0 to 1).

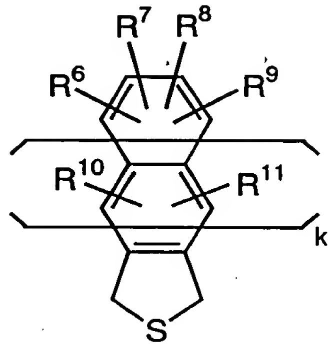
28. The solid electrolytic capacitor as claimed in claim 27, in which the structural unit represented by formula (I) is a chemical structure represented by the following formula (II):



(II)

(wherein the substituents R^4 and R^5 each independently represents hydrogen atom, a linear or branched, saturated or unsaturated C1-6 alkyl group or a substituent for forming at least one 5-, 6- or 7-membered cyclic structure containing the two oxygen elements shown in the formula by combining the C1-6 alkyl groups to each other at any position, the ring structure formed in the scope thereof includes a chemical structure such as a vinylene group which may be substituted and a substituted phenylene group which may be substituted, and δ represents a number of from 0 to 1).

29. A method for producing a solid electrolytic capacitor as claimed in claim 1 comprising a valve acting metal having pores, a dielectric film formed on a surface of the valve acting metal, and a solid electrolyte layer provided on the dielectric film, the method comprising polymerizing a condensed heteropolycyclic compound represented by the following formula (VI):



(VI)

(wherein the substituents R^6, R^7, R^8, R^9, R^{10} and R^{11} each independently represents a monovalent group selected from the group consisting of H, a linear or branched, saturated or unsaturated C1-10 alkyl, alkoxy or alkylester group, a halogen, a nitro group, a cyano group, a primary, secondary or tertiary amino group, a trihalomethyl group, a phenyl group and a substituted phenyl group, the alkyl chains of R^6, R^7, R^8, R^9, R^{10} and R^{11} may combine to each other at any position to form at least one divalent chain for forming at least one 3-, 4-, 5-, 6- or 7-membered saturated or unsaturated hydrocarbon cyclic structure together with the carbon atoms to which the substituents are bonded,

the alkyl group, the alkoxy group or the alkylester group of R^6, R^7, R^8, R^9, R^{10} or R^{11} or the cyclic hydrocarbon chain formed by the substituents may contain any of carbonyl, ether, ester, amide, sulfide, sulfinyl, sulfonyl and imino bonds,

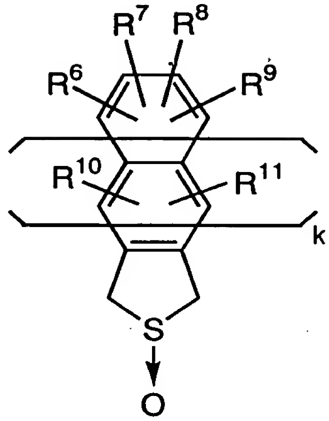
k represents a number of the condensed ring enclosed by the thiophene ring and the benzene ring having substituents R^6 to R^9 and represents an integer of from 0 to 3, and the condensed ring may optionally contain nitrogen or N-oxide) alone or together with another anion having a dopant ability, on the

dielectric film formed on a porous valve acting metal surface by the action of an oxidizing agent to form a solid electrolyte layer on the dielectric film.

30. The method for producing a solid electrolytic capacitor, as claimed in claim 29, in which as the condensed heteropolycyclic compound, there is used at least one member selected from dihydroisothianaphthene, dihydronaphtho[2,3-c]thiophene and dihydrothieno[3,4-b]quinoxaline derivatives.

31. The method for producing a solid electrolytic capacitor, as claimed in claim 29, in which at least one member selected from 1,3-dihydroisothianaphthene, 5,6-dioxymethylene-1,3-dihydroisothianaphthene, 5,6-dimethoxy-1,3-dihydroisothianaphthene, 1,3-dihydronaphtho[2,3-c]thiophene and 1,3-dihydrothieno[3,4-b]quinoxaline.

32. A method for producing a solid electrolytic capacitor as claimed in claim 1 comprising a valve acting metal having pores, a dielectric film formed on a surface of the valve acting metal, and a solid electrolyte layer provided on the dielectric film, the method comprising polymerizing a condensed heteropolycyclic compound represented by the following formula (VII):



(VII)

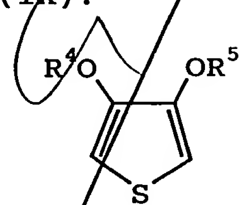
(wherein the substituents R^6, R^7, R^8, R^9, R^{10} and R^{11} and k have the same meanings as in general formula (VI) described in (29) above, and the condensed ring may optionally contain 1 to 2 nitrogen atoms (N) or N-oxide) alone or together with another anion having a dopant ability, on the dielectric film formed on a porous valve acting metal surface by the action of an oxidizing agent to form a solid electrolyte layer on the dielectric film.

33. The method for producing a solid electrolyte as claimed in claim 32, in which as the condensed heteropolycyclic compound, there is used at least one member selected from dihydroisothianaphthene-2-oxide, dihydronaphtho[2,3-c]thiophene-2-oxide and dihydrothieno[3,4-b]quinoxaline-2-oxide derivatives.

34. The method for producing a solid electrolytic capacitor, as claimed in claim 32 in which at least one member selected from 1,3-dihydroisothianaphthene-2-oxide, 5,6-

dioxymethylene-1,3-dihydroisothianaphthene-2-oxide, 5,6-dimethoxy-1,3-dihydroisothianaphthene-2-oxide, 1,3-dihydronaphtho[2,3-c]thiophene-2-oxide and 1,3-dihydrothieno[3,4-b]quinoxaline-2-oxide.

35. A method for producing a solid electrolytic capacitor as claimed in claim 1 comprising a valve acting metal having pores, a dielectric film formed on a surface of the valve acting metal, and an electrically conducting polythiophene composition as a solid electrolyte provided on the dielectric film, the method comprising polymerizing a thiophene monomer represented by the following formula (IX):



(IX)

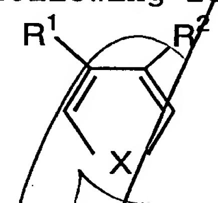
(wherein R^4 and R^5 have the same meanings as defined in (17) above) in the presence of naphthalenesulfonate anion by the action of a persulfate to form a solid electrolyte layer on the dielectric film.

36. The method for producing a capacitor as claimed in claim 35, in which the persulfate is ammonium persulfate or potassium persulfate.

37. The method for producing a capacitor as claimed in any one of claims 29 to 36, in which the polymerization by the action

of an oxidizing agent within the metal oxide pores in the dielectric layer is repeated at least twice.

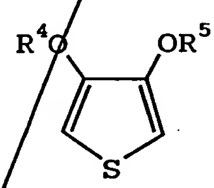
38. A method for producing a capacitor as claimed in claim 15 comprising a valve acting metal having pores, a dielectric film formed on a surface of the valve acting metal, and a solid electrolyte layer comprising an electrically conducting polymer composition layer provided on the dielectric film, in which the method comprises polymerizing a monomer compound represented by the following formula (VIII):



(VIII)

(wherein R^1, R^2 and X have the same meanings as defined in claim 16) in the presence of a compound which donates a sulfoquinone anion by the action of an oxidizing agent to form a solid electrolyte layer.

39. The method for producing a solid electrolytic capacitor as claimed in claim 38, in which the monomer compound represented by general formula (VIII) above is a compound represented by the following general formula (IX):



(IX)

(wherein R^4 and R^5 have the same meanings as defined in claim

17).

40. A method for producing a solid electrolytic capacitor as claimed in claim 15 comprising a valve acting metal having pores, a dielectric film formed on a surface of the valve acting metal, and a solid electrolyte layer comprising an electrically conducting polymer composition provided on the dielectric film, the method comprising polymerizing a monomer by the action of an oxidizing agent to form a solid electrolyte layer on the dielectric film,

in which the method comprises the steps of dipping the valve acting metal having formed thereon the dielectric film layer in a solution containing a monomer compound, and dipping in a solution containing an oxidizing agent and a sulfoquinone anion.

41. The method for producing a solid electrolytic capacitor as claimed in claim 40, in which the valve acting metal having formed thereon the dielectric film layer is dipped in a solution containing a monomer compound and then in a solution containing an oxidizing agent and a sulfoquinone anion.

42. The method for producing a solid electrolytic capacitor as claimed in claim 43, in which the method comprises the step of repeating in a plurality of times the steps of dipping the valve acting metal having formed thereon the dielectric film layer in a solution containing a monomer compound and then

dipping the metal in a solution containing an oxidizing agent and a sulfoquinone anion.

43. The method for producing a solid electrolytic capacitor as claimed in claim 42, in which the method comprises the step of repeating in a plurality of times the steps of dipping the valve acting metal having formed thereon the dielectric film layer in a solution containing a monomer compound and then dipping the metal in a solution containing an oxidizing agent and a sulfoquinone anion, followed by washing and drying.

44. The method for producing a solid electrolytic capacitor as claimed in claim 40, in which the method comprises the step of dipping the valve acting metal having formed thereon the dielectric film in a solution containing an oxidizing agent and a sulfoquinone anion and then dipping the metal in a solution containing a monomer compound.

45. The method for producing a solid electrolytic capacitor as claimed in claim 44, in which the method comprises the step of repeating in a plurality of times the steps of dipping the valve acting metal having formed thereon the dielectric film in a solution containing an oxidizing agent and a sulfoquinone anion and then dipping the metal in a solution containing a monomer compound.

46. The method for producing a solid electrolytic capacitor

as claimed in claim 45, in which the method comprises the step of repeating in a plurality of times the steps of dipping the valve acting metal having formed thereon the dielectric film in a solution containing an oxidizing agent and a sulfoquinone anion and then dipping the metal in a solution containing a monomer compound, followed by washing and drying.

47. A method for producing a solid electrolytic capacitor as claimed in claim 15 comprising a valve acting metal having pores, a dielectric film formed on a surface of the valve acting metal, and a solid electrolyte layer comprising an electrically conducting polymer composition provided on the dielectric film, the method comprising polymerizing a monomer by the action of an oxidizing agent to form a solid electrolyte layer on the dielectric film,

in which the method comprises the steps of dipping the valve acting metal having formed thereon the dielectric film layer in a solution containing an oxidizing agent and of dipping the metal in a solution containing a monomer compound and a sulfoquinone anion.

48. The method for producing a solid electrolytic capacitor as claimed in claim 47, in which the valve acting metal having formed thereon the dielectric film layer is dipped in a solution containing an oxidizing agent and then in a solution containing a monomer compound and a sulfoquinone anion.

49. The method for producing a solid electrolytic capacitor as claimed in claim 48, in which the method comprises the step of repeating in a plurality of times the steps of dipping the valve acting metal having formed thereon the dielectric film layer in a solution containing an oxidizing agent and then dipping the metal in a solution containing a monomer compound and a sulfoquinone anion.

50. The method for producing a solid electrolytic capacitor as claimed in claim 49, in which the method comprises the step of repeating in a plurality of times the steps of dipping the valve acting metal having formed thereon the dielectric film layer in a solution containing an oxidizing agent and then dipping the metal in a solution containing a monomer compound and a sulfoquinone anion, followed by washing and drying.

51. The method for producing a solid electrolytic capacitor as claimed in claim 47, in which the valve acting metal having formed thereon the dielectric film layer is dipped in a solution containing a monomer compound and a sulfoquinone anion and then in a solution containing an oxidizing agent.

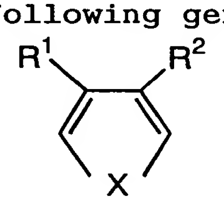
52. The method for producing a solid electrolytic capacitor as claimed in claim 51, in which the method comprises the step of repeating in a plurality of times the steps of dipping the valve acting metal having formed thereon the dielectric film layer in a solution containing a monomer compound and a

sulfoquinone anion and then dipping the metal in a solution containing an oxidizing agent.

53. The method for producing a solid electrolytic capacitor as claimed in claim 52, in which the method comprises the step of repeating in a plurality of times the steps of dipping the valve acting metal having formed thereon the dielectric film layer in a solution containing a monomer compound and a sulfoquinone anion and then dipping the metal in a solution containing an oxidizing agent, followed by washing and drying.

54. The method for producing a solid electrolytic capacitor as claimed in any one of claims 38 to 53, in which the oxidizing agent is a persulfate.

55. The method for producing a solid electrolytic capacitor as claimed in any one of claims 40 to 53, in which the oxidizing agent is a persulfate and the monomer compound is a compound represented by the following general formula (VIII)

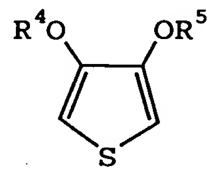


(VIII)

(wherein R^1, R^2 and X have the same meanings as defined in claim 16).

56. The method for producing a solid electrolytic capacitor as claimed in claim 55, in which the monomer compound

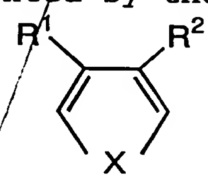
represented by the general formula (VIII) above is a compound represented by the following general formula (IX)



(IX)

(wherein R^4 and R^5 have the same meanings as defined in claim 17).

57. A method for producing a capacitor as claimed in claim 22 comprising a valve acting metal having pores, a dielectric film formed on a surface of the valve acting metal, and a solid electrolyte layer comprising an electrically conducting polymer composition layer provided on the dielectric film, the method comprising polymerizing a monomer compound by the action of an oxidizing agent on the oxide dielectric film, in which the compound represented by the following formula (VIII):

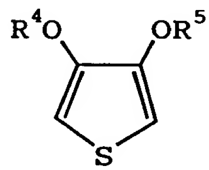


(VIII)

(wherein R^1, R^2 and X have the same meanings as defined in claim 27) is polymerized in the presence of a compound which donates at least one anthracenemonosulfonate anion selected from anthracenesulfonic acid and derivatives thereof to form a solid electrolyte layer.

59. The method for producing a solid electrolytic capacitor

as claimed in claim 57, in which the monomer compound represented by general formula (VIII) above is a compound represented by the following general formula (IX):



(IX)

(wherein R^4 and R^5 have the same meanings as defined in claim 28).

59. A method for producing a solid electrolytic capacitor as claimed in claim 22 comprising a valve acting metal having pores, a dielectric film formed on a surface of the valve acting metal, and a solid electrolyte layer comprising an electrically conducting polymer composition provided on the dielectric film, the method comprising polymerizing a monomer by the action of an oxidizing agent to form a solid electrolyte layer on the dielectric film,

in which the method comprises the steps of dipping the valve acting metal having formed thereon the dielectric film layer in a solution containing a monomer compound, and dipping in a solution containing an oxidizing agent and at least one anthracenemonosulfonate anion selected from anthracenesulfonic acid having one sulfonate group and derivatives thereof.

60. The method for producing a solid electrolytic capacitor

as claimed in claim 59, in which the valve acting metal having formed thereon the dielectric film layer is dipped in a solution containing a monomer compound and then in a solution containing an oxidizing agent and at least one anthracenemonosulfonate anion selected from anthracenesulfonic acid having a sulfonate group and derivatives thereof.

61. The method for producing a solid electrolytic capacitor as claimed in claim 60, in which the method comprises the step of repeating in a plurality of times the steps of dipping the valve acting metal having formed thereon the dielectric film layer in a solution containing a monomer compound and then dipping the metal in a solution containing an oxidizing agent and at least one anthracenemonosulfonate anion selected from anthracenesulfonic acid having one sulfonate group and derivatives thereof.

62. The method for producing a solid electrolytic capacitor as claimed in claim 61, in which the method comprises the step of repeating in a plurality of times the steps of dipping the valve acting metal having formed thereon the dielectric film layer in a solution containing a monomer compound and then dipping the metal in a solution containing an oxidizing agent and at least one anthracenemonosulfonate anion selected from anthracenesulfonic acid having one sulfonate group and derivatives thereof, followed by washing and drying.

63. The method for producing a solid electrolytic capacitor as claimed in claim 59, in which the method comprises the step of dipping the valve acting metal having formed thereon the dielectric film in a solution containing an oxidizing agent and at least one anthracenemonosulfonate anion selected from anthracenesulfonic acid having one sulfonate group and derivatives thereof and then dipping the metal in a solution containing a monomer compound.

64. The method for producing a solid electrolytic capacitor as claimed in claim 63, in which the method comprises the step of repeating in a plurality of times the steps of dipping the valve acting metal having formed thereon the dielectric film in a solution containing an oxidizing agent and at least one anthracenemonosulfonate anion selected from anthracenesulfonic acid having one sulfonate group and derivatives thereof and then dipping the metal in a solution containing a monomer compound.

65. The method for producing a solid electrolytic capacitor as claimed in claim 64, in which the method comprises the step of repeating in a plurality of times the steps of dipping the valve acting metal having formed thereon the dielectric film in a solution containing an oxidizing agent and at least one anthracenemonosulfonate anion selected from anthracenesulfonic acid having one sulfonate group and derivatives thereof and then dipping the metal in a solution

containing a monomer compound, followed by washing and drying.

66. A method for producing a solid electrolytic capacitor as claimed in claim 22 comprising a valve acting metal having pores, a dielectric film formed on a surface of the valve acting metal, and a solid electrolyte layer comprising an electrically conducting polymer composition provided on the dielectric film, the method comprising polymerizing a monomer by the action of an oxidizing agent to form a solid electrolyte layer on the dielectric film,

in which the method comprises the steps of dipping the valve acting metal having formed thereon the dielectric film layer in a solution containing an oxidizing agent and of dipping the metal in a solution containing a monomer compound and an anthracenemonosulfonate anion.

67. The method for producing a solid electrolytic capacitor as claimed in claim 66, in which the valve acting metal having formed thereon the dielectric film layer is dipped in a solution containing an oxidizing agent and then in a solution containing a monomer compound and at least one anthracenemonosulfonate anion selected from anthracenesulfonic acid having one sulfonate group and derivatives thereof.

68. The method for producing a solid electrolytic capacitor as claimed in claim 67, in which the method comprises the step of repeating in a plurality of times the steps of dipping the

valve acting metal having formed thereon the dielectric film layer in a solution containing an oxidizing agent and then dipping the metal in a solution containing a monomer compound and at least one anthracenemonosulfonate anion selected from anthracenesulfonic acid having one sulfonate group and derivatives thereof.

69. The method for producing a solid electrolytic capacitor as claimed in claim 68, in which the method comprises the step of repeating in a plurality of times the steps of dipping the valve acting metal having formed thereon the dielectric film layer in a solution containing an oxidizing agent and then dipping the metal in a solution containing a monomer compound and at least one anthracenemonosulfonate anion selected from anthracenesulfonic acid having one sulfonate group and derivatives thereof, followed by washing and drying.

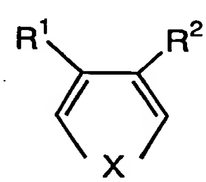
70. The method for producing a solid electrolytic capacitor as claimed in claim 66, in which the valve acting metal having formed thereon the dielectric film layer is dipped in a solution containing a monomer compound and at least one anthracenemonosulfonate anion selected from anthracenesulfonic acid having one sulfonate group and derivatives thereof and then in a solution containing an oxidizing agent.

71. The method for producing a solid electrolytic capacitor

as claimed in claim 70, in which the method comprises the step of repeating in a plurality of times the steps of dipping the valve acting metal having formed thereon the dielectric film layer in a solution containing a monomer compound and at least one anthracenemonosulfonate anion selected from anthracenesulfonic acid having one sulfonate group and derivatives thereof and then dipping the metal in a solution containing an oxidizing agent.

72. The method for producing a solid electrolytic capacitor as claimed in claim 71, in which the method comprises the step of repeating in a plurality of times the steps of dipping the valve acting metal having formed thereon the dielectric film layer in a solution containing a monomer compound and at least one anthracenemonosulfonate anion selected from anthracenesulfonic acid having one sulfonate group and derivatives thereof and then dipping the metal in a solution containing an oxidizing agent, followed by washing and drying.

73. The method for producing a solid electrolytic capacitor as claimed in any one of claims 59 to 72, in which the monomer compound is a compound represented by the following general formula (VIII)

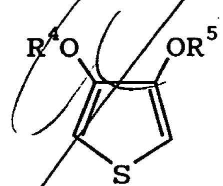


(VIII)

(wherein R^1, R^2 and X have the same meanings as defined in claim

27).

74. The method for producing a solid electrolytic capacitor as claimed in claim 73, in which the monomer compound represented by the following general formula (VIII) is a compound represented by the following general formula (IX)



(IX)

(wherein R^4 and R^5 have the same meanings as defined in claim 28).

75. The method for producing a solid electrolytic capacitor as claimed in any one of claims 57 to 73, in which the oxidizing agent is a persulfate.